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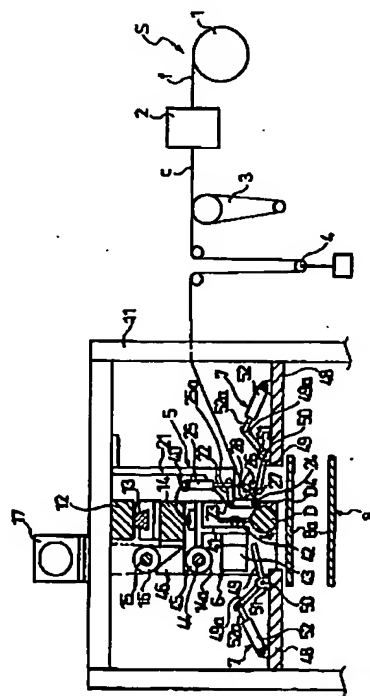
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(54) 【発明の名称】 空気入りラジアルタイヤのベルト部材成形方法及び装置

(57) 【要約】

【課題】 タイヤ仕様毎のベルト部材のストックスペースや端尺の問題を解消し、かつ多品種少量生産を効率良く行う。

【解決手段】 ゴム被覆コードcをその巻付け開始端c₁と巻付け終了端c₂とが巻付けドラムDの軸方向に延びる切断ラインL上に位置するように、巻付けドラムDに螺旋状にベルト周長に対応する長さだけ順次巻き付け、巻付けドラムD上にゴム被覆コードcを螺旋状に配列した筒状体Nを成形する。次いで筒状体Nを切断ラインLに沿って切断し、その切断された筒状体Nを巻付けドラムDから外して平面状に展開し、ベルト部材にする。



【特許請求の範囲】

【請求項1】 ゴム被覆コードをその巻付け開始端と巻付け終了端とが巻付けドラムの軸方向に延びる切断ライン上に位置するように、該巻付けドラムに螺旋状にベルト周長に対応する長さだけ順次巻き付け、前記巻付けドラム上にゴム被覆コードを螺旋状に配列した筒状体を成形する工程と、該筒状体を前記切断ラインに沿って切断する工程と、前記切断された筒状体を前記巻付けドラムから外して平面状に展開することにより、切断端をベルト幅方向にしたベルト部材を成形する工程とからなる空気入りラジアルタイヤのベルト部材成形方法。

【請求項2】 前記筒状体を成形する工程が、連続する1本のゴム被覆コードの巻付け開始端を前記切断ライン上に位置させるようにして巻付け開始端部を前記巻付けドラム上に保持する工程と、前記巻付けドラムをその軸方向に移動させると共に回転させることにより前記ゴム被覆コードを螺旋状にベルト周長に対応する長さだけ巻き付ける工程と、前記ゴム被覆コードを前記切断ライン上となる巻付け終了位置で切断する工程と、前記切断されたゴム被覆コードの巻付け開始端位置をゴム被覆コード幅だけずらして、前記3つの工程を前記筒状体が成形されるまで繰り返す工程とからなる請求項1に記載の空気入りラジアルタイヤのベルト部材成形方法。

【請求項3】 ゴム被覆コードを巻き付ける巻付けドラムを回転かつ軸方向に往復移動可能に横設すると共に、2分割構造で下端を中心に開閉可能に構成し、該巻付けドラムとゴム被覆コードを供給する供給手段との間に、該ゴム被覆コードの先端部を保持して該巻付けドラムに押圧可能で、かつ該ゴム被覆コードを切断可能なコード巻付け手段を前記巻付けドラムに対して進退可能に設置し、前記巻付けドラムにその軸方向に沿って往復移動可能なカッターを対設する一方、前記巻付けドラムが開状態になった時に前記巻付けドラムから切断されたゴム被覆コードの筒状体を取り外す取外し手段と、取り外された切断筒状体を平面状に押し広げる展開手段とを設置した空気入りラジアルタイヤのベルト部材成形装置。

【請求項4】 前記巻付けドラムの巻付け面の縦断面形状が円形である請求項3に記載の空気入りラジアルタイヤのベルト部材成形装置。

【請求項5】 前記巻付けドラムの巻付け面の縦断面形状が、左右に屈曲部を有し、両屈曲部間の長さが一方側と他方側で異なる請求項3に記載の空気入りラジアルタイヤのベルト部材成形装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、空気入りラジアルタイヤに用いられるベルト部材の成形方法及び装置に関し、更に詳しくは、多品種少量生産を効率良く行うことができる空気入りラジアルタイヤのベルト部材成形方法及び装置に関する。

【0002】

【従来の技術】 一般に、空気入りラジアルタイヤのベルト層は、クリールスタンドから引き出された多数本の引き揃え補強コードに未加硫ゴムを含浸するようにカレンダー処理した広幅の帯状体を所定の角度、幅にバイアスカットし、このバイアスカットされた帯片をカット側を左右の両縁部となるように継ぎ合わせて長尺のベルト材にし、それをドラムに巻き取って一旦ストックする。ベルト層成形時にベルト材をドラムから引き出し、ベルト層の周長に相当する長さの補強コードに沿う方向に切断してベルト部材を得るようにしている。

【0003】 しかしながら、タイヤサイズに応じて幅や長さ、角度が異なるため、上記のように成形するベルト部材は、タイヤ仕様毎に寸法の違うベルト材をストックする必要がある。従って、極めて多種類のベルト材を用意しておくために、広いストックスペースを要するという問題があった。また、他のタイヤ仕様のベルト材を転用できないため、タイヤ生産過程ではタイヤ仕様毎のベルト材に端尺が発生し、材料が無駄になったり、処理工数を要するという問題があった。更に、多品種少量生産を行う場合には、タイヤ仕様を変更する毎に長尺のベルト材を巻き取ったドラムを交換する大がかりな段取り替え作業を頻繁に行う必要があるという問題があった。

【0004】

【発明が解決しようとする課題】 本発明の目的は、タイヤ仕様毎のベルト材のストックスペースや端尺の問題を解消し、かつ多品種少量生産を効率良く行うことができる空気入りラジアルタイヤのベルト部材成形方法及び装置を提供することにある。

【0005】

【課題を解決するための手段】 上記目的を達成する本発明の空気入りラジアルタイヤのベルト部材成形方法は、ゴム被覆コードをその巻付け開始端と巻付け終了端とが巻付けドラムの軸方向に延びる切断ライン上に位置するように、該巻付けドラムに螺旋状にベルト周長に対応する長さだけ順次巻き付け、前記巻付けドラム上にゴム被覆コードを螺旋状に配列した筒状体を成形する工程と、該筒状体を前記切断ラインに沿って切断する工程と、前記切断された筒状体を前記巻付けドラムから外して平面状に展開することにより、切断端をベルト幅方向にしたベルト部材を成形する工程とからなることを特徴とする。

【0006】 また、本発明の空気入りラジアルタイヤのベルト部材成形装置は、ゴム被覆コードを巻き付ける巻付けドラムを回転かつ軸方向に往復移動可能に横設すると共に、2分割構造で下端を中心に開閉可能に構成し、該巻付けドラムとゴム被覆コードを供給する供給手段との間に、該ゴム被覆コードの先端部を保持して該巻付けドラムに押圧可能で、かつ該ゴム被覆コードを切断可能なコード巻付け手段を前記巻付けドラムに対して進退可

能に設置し、前記巻付けドラムにその軸方向に沿って往復移動可能なカッターを対設する一方、前記巻付けドラムが開状態になった時に前記巻付けドラムから切断されたゴム被覆コードの筒状体を取り外す取外し手段と、取り外された切断筒状体を平面状に押し広げる展開手段とを設置したことを特徴とする。

【0007】このようにゴム被覆コードを使用し、それを巻付け開始端と巻付け終了端とを切断ライン上になるようにして、巻付けドラムに螺旋状に順次巻き付けて筒状体を成形し、それを切断して展開することによりベルト部材を成形するようにしたので、タイヤ仕様により寸法の違うベルト部材、例えば、ベルト幅が同じで、ベルト周長が異なるベルト部材を成形する際には、ゴム被覆コードを巻き付ける長さを変更することにより対応でき、また、ベルト幅が異なるベルト部材を成形する場合には、ベルト幅とドラム周長が同じであるため、巻付けドラムを交換することで対応することができ、更に、ベルト部材のコード角度を変更する場合には、巻付けドラムへのゴム被覆コードの巻付け角度を変えることにより対応することができる。

【0008】従って、従来のようにタイヤ仕様毎のベルト材を用意することなく、多種類のタイヤサイズのベルト部材の生産が可能になり、ストックスペースを排除し、かつ大がかりな段取り替え作業をすることなく、多品種少量生産を効率よく行うことができる。また、ゴム被覆コードからベルト部材を作るため、端尺の発生を極端に減らすことができる。

【0009】

【発明の実施の形態】以下、本発明の構成について添付の図面を参照しながら詳細に説明する。図1、2は、本発明の空気入りラジアルタイヤのベルト部材成形装置の一例を示す。1はベルト部材の補強コードとして使用されるスチールコードfを供給するレットオフ、2はスチールコードfを未加硫ゴムで被覆してゴム被覆コードcに成形するゴム被覆装置、3はレットオフ1からスチールコードfを引き出し、かつゴム被覆装置2で形成されたゴム被覆コードcを前方へ搬送する送り装置、4は送り装置3の送り速度と巻付けドラムDの巻付け速度との差を調整するダンサーロールであり、これらが順次設置されてゴム被覆コードcを供給する供給手段Sを構成している。

【0010】5はゴム被覆コードcの先端部を保持して巻付けドラムDに押圧可能で、かつゴム被覆コードcを切断可能なコード巻付け手段、6は巻付けドラムD上にゴム被覆コードcを隙間無く巻き付けて成形された筒状体を切断する切断装置、7は切断された筒状体を外し、かつ平面状に押し広げてベルト部材にする取外し展開手段、8はベルト部材を搬送する搬送手段である。

【0011】立設された支持フレーム11の上部に水平に支持された1本のガイド部材12の下端面に、リニア

モーションベアリング13を介して移動体14がガイド部材12に沿って往復移動自在に取り付けられている。ガイド部材12に沿って延びるボールネジ15が支持フレーム11の上部に回転自在に支持され、このボールネジ15に移動体14に突設したメネジ部16が螺合している。支持フレーム11上に取り付けられたモータ17の駆動により、ボールネジ15が回転し、移動体14がガイド部材12に沿って往復移動できるようになっている。ガイド部材12に沿って延びる移動体14の両側部に垂下された両脚部14a間には、ガイド部材12に沿って水平に延びる巻付けドラムDが着脱自在でかつ回転自在に支持されている。この巻付けドラムDは、一方の脚部14aに取り付けられたモータXにより回転できるようになっている。

【0012】巻付けドラムDは、円筒状に形成されると共に、図3に示すように、左右2分割構造に構成され、その左右のドラム片D1を連結する下端部の連結部D2を中心に2段式シリンダZにより左右に開閉可能になっている。両ドラム片D1の上端部（連結部D2と反対側の端部）にはドラム軸方向に沿って切欠き部D3が形成され、図3(a)の閉状態になった時に両切欠き部D3が巻付け面D4に対して凹状の溝部D5をドラム両端まで形成するようにしてある。巻付けドラムD内には、不図示の電磁式マグネットなどが配設され、巻付けドラムDに巻き付けられたゴム被覆コードcを保持できるようにしている。巻付けドラムDの破線斜線部Yがマグネットの磁着領域である。この磁着領域はゴム被覆コードcの先端部と後端部を留めるために少なくとも巻付けドラムDの両端部に配置し、必要に応じて巻付けドラムDの中央部に配置するようにしてもよい。

【0013】巻付けドラムDの一端側には、フランジ18を介してゴム被覆コードcの先端部を巻付けドラムD上に押さえて保持する押さえ手段19が設けられている。この押さえ手段19は、図4のように構成することができる。図4において、フランジ18にはガイド60が巻付けドラムDの軸方向に摺動可能に組み付けられ、このガイド60の両端部にそれぞれ支持部材61を介して一対のローラ62が回転可能に支持されている。一対のローラ62にはスポンジ状の外周面を有する環状ベルト63が掛け回され、このベルト63が巻付けドラムD上に配置されたゴム被覆コードcを押さえ付けるようになっている。また、ローラ62の脇には小径のローラ64が挿入され、これが被覆コードcを押さえ易くしている。ベルト63を巻付けドラムDの軸方向に移動させる手段として、一方の支持部材61には駆動棒65が連結されている。この駆動棒65は支持部材61に対して進退可能になっている。

【0014】図4に示すキャタピラー構造の押さえ手段19によれば、巻付けドラムD上のゴム被覆コードcをベルト63により1本ずつに押さえ付けることができ

る。また、巻付けドラムDの回転中はベルト63でゴム被覆コードcの先端部を押さえ付けた状態にし、支持部材61と駆動棒65との連結を解除する。ベルト63はスポンジ状の外周面を有しているので、駆動棒65を切り離してもゴム被覆コードcの係止状態は保持される。

【0015】また、押さえ手段19は、図5のように構成してもよい。図5において、フランジ18から延長する支持板70には巻付けドラムDの軸方向に沿って複数の貫通孔が設けられ、各貫通孔にロッド71が挿入されている。これらロッド71は貫通孔から抜けないように両端部に凸部72を有しており、その後端側において支持板70と凸部72との間にバネ73が挿入されている。また、ロッド71の後端側には巻付けドラムDの軸方向に進退可能で先端に傾斜面を有するロッド押さえ74が配置されており、このロッド押さえ74に押されてロッド71の先端部が巻付けドラムD側へ突出するようになっている。この図5に示す押さえ手段19によれば、巻付けドラムD上のゴム被覆コードcをロッド71により1本ずつに押さえ付けることができる。

【0016】コード巻付け手段5は巻付けドラムDと供給手段Sとの間に設置されている。このコード巻付け手段5は、支持フレーム11の上部から垂下された支持部材21の下端部にく字状のアーム部材22を備えている。このアーム部材22は屈曲部がピン23により支持部材21に連結され、ピン23を中心に回転自在になっている。アーム部材22の下端部には、ゴム被覆コードcを巻付けドラムD上に押し付ける圧着ローラ24が回転自在に支持されている。アーム部材22の上端部には、支持部材21に取り付けられたエアシリンダ25から突出するロッド25aの先端部が連結され、ロッド25aの伸縮により、圧着ローラ24が巻付けドラムDの巻付け面D4にゴム被覆コードcを押し付ける圧着位置と、巻付けドラムDから離れた離間位置との間を進退するようにしてある。この圧着位置は押さえ手段19に近接するように出来るだけ上部に設定することが好ましい。26、27は圧着ローラ24にゴム被覆コードcを導くためのガイドローラであり、アーム部材22に突設されたブラケット28に回転自在に支持されている。

【0017】また、支持部材21には、ゴム被覆コードcの先端部を保持するための先端部保持手段80と、ゴム被覆コードcを切断するコード切断手段90とがそれぞれ設けられている。先端部保持手段80は図6のように構成することができる。図6において、アーム部材22の下部には押さえ板81を備えたアーム部材82が圧着ローラ24の回転軸からずれた位置にピン83を中心として回転自在に取り付けられている。このアーム部材82にはアーム部材22に取り付けられたエアシリンダ84から突出するロッド84aの先端部が連結されており、エアシリンダ84の出限で押さえ板81を圧着ローラ24に接触させてゴム被覆コードcを保持し、エアシ

リンダ84の戻りで押さえ板81を圧着ローラ24から離間させて圧着ローラ24の自由回転を許容するようになっている。また、エアシリンダ84の出限でシリンダ25により圧着ローラ24を巻付けドラムDに押さえ付けると、シリンダ25の押圧力により押さえ板81は適宜の位置まで押し戻される。

【0018】一方、コード切断手段90は図7のように構成することができる。図7において、アーム部材22の下端部には鉤構造を有するカッター91を備えたアーム部材92が揺動自在に取り付けられている。このアーム部材92にはアーム部材22に取り付けられたエアシリンダ93から突出するロッド93aの先端部が連結されており、エアシリンダ93の出限でカッター91を圧着ローラ24と巻付けドラムDの間におけるコード供給路に移動させ、エアシリンダ93の戻りでカッター91をコード供給路から外れる位置に移動させるようになっている。また、アーム部材92にはエアシリンダ94が搭載され、そのロッド94aの先端部がカッター91に連結されており、エアシリンダ94の出限でカッター91による切断を行うようになっている。

【0019】上述した先端部保持手段80及びコード切断手段90は以下の動作を行うように設定されている。図8に示すように、ゴム被覆コードcが巻き終わると、エアシリンダ25の動作により圧着ローラ24は巻付けドラムDから離れる。このとき、エアシリンダ93の動作によりコード切断手段90のカッター91がコード供給路に移動し、その刃間にゴム被覆コードcが入る。そして、エアシリンダ84の動作により押さえ板81が移動し、ゴム被覆コードcが圧着ローラ24に固定された後、エアシリンダ94の動作によりカッター91が閉じてゴム被覆コードcが切断される。

【0020】移動体14には上記切断装置6が設けられている。この切断装置6は、移動体14の下面に、リニアモーションベアリング40を介して連結されたT字状の支持体41の下端部に円盤状のカッター42を備えた構造になっている。支持体41の下端部に固定された駆動モータ43の回転軸にカッター42が固設され、駆動モータ43の回転により回転可能になっている。両脚部14aの上部間には、移動体14（巻付けドラムD）に沿って延びるボールネジ44が回転自在に支持され、支持体41の上端部に設けられたメネジ部45がボールネジ44に螺合し、移動体14に取り付けられたモータ46の駆動によりボールネジ44が回転し、支持体41と共にカッター42が巻付けドラムDの軸方向に沿って往復移動する。カッター42は、巻付けドラムDの溝部D5を通り、その溝部D5でゴム被覆コードcからなる筒状体を切断するようにしており、溝部D5の幅方向中心を結ぶ線が切断ラインLになっている。

【0021】巻付けドラムDの両側に、左右の取外し展開手段7がそれぞれ設置されている。支持フレーム11

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内側に水平方向に突設された両支持板48上の先端部に、巻付けドラムDの軸方向に沿って延びる板状の押さえ部材49が設けられている。押さえ部材49の後端部が、ピン50により、支持板48上に突設されたブラケット51に連結され、ピン50を中心に揺動自在になっている。また、押さえ部材49の後端部には、アーム片49aの先端部が固定され、そのアーム片49aの後端部が、支持板48上に配置されたシリンダ52のロッド52aに連結され、そのロッド52aの伸縮により、押さえ部材49はピン50を中心に上下に揺動可能になっている。巻付けドラムDの下方に、取外し展開手段7により取り外された平面状に押し広げられたベルト部材を搬送する上記搬送手段8が設けられている。図中8aはそのコンベアベルトである。

【0022】以下、上述した装置により本発明のベルト部材成形方法について説明する。送り装置3の作動により、レットオフ1から引き出された1本のスチールコードfがゴム被覆装置2で未加硫ゴムが被覆されてゴム被覆コードcに連続成形される。このゴム被覆コードcは、ダンサーロール4を経て、コード巻付け手段5に送られる。コード巻付け手段5の先端部保持手段80でゴム被覆コードcの先端部を保持すると、シリンダ25のロッド25aが伸長し、先端（巻付け開始端）c₁を図9に示すように、巻付けドラムDの軸方向に延びる切断ラインL上に位置するようにして、先端部（巻付け開始端部）c₁を巻付けドラムDに圧着する。

【0023】次いで押さえ手段19によりゴム被覆コードcの先端部c₁が保持されると、先端部保持手段80が保持を解除する。モータ17が作動して、移動体14が図2の右方向に移動し、それに伴って巻付けドラムDが同方向に移動する。それと同時に、モータXの駆動により巻付けドラムDが図1の矢印の方向に回転する。それにより、巻付けドラムDにゴム被覆コードcが圧着ローラ24により押圧されながら螺旋状に巻き付けられる。巻付けドラムDの軸方向への移動速度Aと回転速度Bを調整することにより、ゴム被覆コードcの軸方向に対する巻付け角度θを調整する。ちなみに、角度 $\theta = \tan^{-1} B/A$ であり、この角度θは、ベルト部材の補強コードのタイヤ周方向に対する傾斜角度となる。ベルト周長に対応する長さ（この長さは、ゴム被覆コードcの巻付け終了端c₂が切断ラインL上に位置するようにした長さでもある）だけ図10のように巻き付けられると、コード切断手段90が前進し、ゴム被覆コードcが切断される。その際、先端部保持手段80がゴム被覆コードcの新しく巻付け開始端部となる部分c₁を保持する。

【0024】切断すると、シリンダ25が縮動して、圧着ローラ24及び先端部保持手段80が後退する。先端部保持手段80は新たな巻付け開始端部を保持した状態である。次いで、モータ17の作動により移動体14が図2の左方向に移動し、それに伴って巻付けドラムDが

巻付け開始位置へと移動する。その位置は、ゴム被覆コードcの幅だけ図の右側にずれた位置となる。そして、上記と同様にして、新たな巻付け開始端が切断ラインL上に位置するようにして、その巻付け開始端部を巻付けドラムDに圧着し、次のゴム被覆コードを既に巻き付けられたゴム被覆コードcに隣接して巻き付けていく。上記巻付け工程を繰り返し行うことにより、巻付けドラムD上にゴム被覆コードcを隙間無く螺旋状に配列した筒状体Nを成形する（図11）。なお、図11において、Mはベルト周長であり、1本目から複数本目までのゴム被覆コードc'は、ベルト周長Mに応じて他のゴム被覆コードc''より1周分多く巻き付けられ、その巻付け終了端を切断ラインL上に位置させている。2点鎖線で示すcは、1本目のゴム被覆コードが巻き付けられた状態を示す。

【0025】筒状体Nが成形されると、巻付けドラムDが回転し、切断ラインLをカッター42の走行ライン上に位置させる。切断手段6の駆動モータ43の作動によりカッター42が回転すると、モータ46の駆動により支持体41と共にカッター42が切断ラインL上を走行し、筒状体Nを切断する。巻付けドラムDが開状態となり、次いで内設された電磁式マグネットがオフになると、左右の取外し展開手段7が、図12に示すように、切断された筒状体Nの取り外し動作を行う。シリンダ52のロッド52aが伸長し、それによって、押さえ部材49がピン50を中心に下方に移動し、その先端49Xを切断された筒状体Nの切断端Naに押し当てて、コンベアベルト8a上に切断された筒状体を下ろす。このコンベアベルト8a上で弓なり状に湾曲する切断筒状体N'の両端部N'bを更に押さえ部材49でコンベアベルト8aに押しつけることにより、平面状に展開した状態にし、切断端をベルト幅方向にしたベルト部材Vを成形する。このベルト部材Vは、コンベアベルト8a上を搬送され、不図示のベルト成形ドラムに供給される。

【0026】タイヤ仕様により寸法の違うベルト部材を成形する場合には、以下のようにして行う。ベルト幅が同じで、ベルト周長が異なるベルト部材を成形する場合には、ゴム被覆コードcの巻付け長さを変えることにより対応する。ベルト幅が異なるベルト部材を成形する場合には、巻付けドラムDを交換する（ベルト幅と同じ周長をもつ巻付けドラムを使用）ことで対応する。ベルト部材のコード角度を変更する場合には、巻付けドラムDの軸方向への移動速度Aと回転速度Bを調整することにより、ゴム被覆コードcの巻付け角度θを変更して対応する。更に、ベルト部材の補強コードのエンド数（配列密度）を変更する場合には、スチールコードfを被覆するゴム量を変更すると共に、ゴム被覆コードcを並べる間隔を変更することにより対応することができる。

【0027】従って、本発明によれば、タイヤ仕様毎に寸法の違うベルト材のストックが不要になり、また、端

尺の心配もなく、タイヤ仕様を変更する毎に長尺のベルト材を巻き取ったドラムを交換する大がかりな段取り替え作業を行わずに、多品種少量生産を効率良く行うことができる。本発明において、上記実施形態では、巻付けドラムDとして、軸方向に対して直交する方向に切断した際の巻付け面D4の縦断面形状が円形のものを使用した。それに代えて、図13に示すように、左右に屈曲部Dxを有し、両屈曲部Dx間の長さが一方側と他方側で異なるようにしたものを使用するようにしてもよい。図では、一方側の巻付け面D4aが他方側の巻付け面D4bより径が小さい円弧で形成されている。左右の屈曲部Dxは、その角部が小さな円弧で面取りされている。

【0028】このような巻付けドラムDの使用により、ゴム被覆コードcを螺旋状に巻き付けて、それを展開すると、図14に示すように、中央部と両側部で、ゴム被覆コードcの傾斜角度が異なり、一方側の巻付け面D4aに巻き付けられた中央部の方がベルト部材の長手方向（タイヤ周方向）となる方向に対する傾斜角度が大きくなる。従って、中央部のコード角度を大きく、両側部のコード角度を小さくしたベルト部材の成形が可能になる。また、このように成形されたベルト部材は、中央のエンド数（単位幅当たりのコード本数）より両端部のエンド数が多くなるため、このベルト部材を使用したタイヤではエッジ部の剛性が高くなるので、ロードノイズと高速耐久性の向上を図ることができる。また、図とは逆に、他方側の巻付け面D4bを一方側の巻付け面D4aより径が小さい円弧で形成したドラムにした場合には、一方側の巻付け面D4aに巻き付けられた中央部の方がゴム被覆コードcの傾斜角度が小さくなり、中央部のコード角度を小さく、両側部のコード角度を大きくしたベルト部材を成形することができる。

【0029】本発明では、上記のように1本のスチールコードIをゴム被覆したゴム被覆コードcを使用することにより、タイヤ仕様毎に寸法の違う全ての種類のベルト部材を成形することができるので好ましいが、2本、3本等複数本のスチールコードをゴム被覆したものを上記のように巻付けるようにしてもよい。また、上記実施形態では、押さえ部材49により切断された筒状体を下ろし、かつコンベアベルト8a上に下ろした湾曲する切断筒状体N'を平面状にしたが、それに代えて、押さえ部材49により切断された筒状体を下ろす工程のみを行い、搬送側のコンベアベルト8a上にピンチローラを対設し、そのピンチローラによりコンベアベルト8a上を搬送される湾曲する切断筒状体N'を押さえ平面上にするようにしてもよく、切断された筒状体の取外し手段と、取り外された切断筒状体の展開手段とを別々に設けてもよい。

【0030】ゴム被覆コードに用いられるコードとして、上記実施形態ではスチールコードの例を示したが、ベルト部材に用いられるコードであれば、いずれの補強

コードであってもよく、例えば、芳香族ポリアミド繊維コードのような有機繊維コードを用いるものであってもよい。その場合、巻付けドラムDに巻き付けられたゴム被覆コードcを巻付け面D4上に保持する際に、上述したマグネットに代えて、巻付けドラムDの巻付け面D4に多数の微細な孔を形成し、内側から吸引する吸着手段を設けるようにすればよい。

【0031】

【発明の効果】上述したように本発明は、ゴム被覆コードをその巻付け開始端と巻付け終端とが巻付けドラムの軸方向に延びる切断ライン上に位置するように、該巻付けドラムに螺旋状にベルト周長に対応する長さだけ順次巻き付け、前記巻付けドラム上にゴム被覆コードを隙間無く螺旋状に配列した筒状体を成形し、該筒状体を前記切断ラインに沿って切断し、前記切断された筒状体を前記巻付けドラムから外して平面状に展開することにより、切断端をベルト幅方向にしたベルト部材を成形するので、タイヤ仕様毎のベルト部材のストックスペースや端尺の問題を解消し、かつ多品種少量生産を効率良く行うことができる。

【図面の簡単な説明】

【図1】本発明の空気入りラジアルタイヤのベルト部材成形装置の概略説明図である。

【図2】図1の要部を取外し展開手段を除いて示す左側面説明図である。

【図3】(a)は巻付けドラムの閉状態を示す断面図、(b)は巻付けドラムの開状態を示す断面図である。

【図4】(a)は押さえ手段の一例を示す側面図、(b)はその正面図である。

【図5】押さえ手段の他の例を示す側面図である。

【図6】(a)は先端部保持手段の一例を示す側面図、(b)はその正面図である。

【図7】コード切断手段の一例を示す側面図である。

【図8】先端部保持手段とコード切断手段の動作を示す説明図である。

【図9】ゴム被覆コードの巻付け開始端部を示す説明図である。

【図10】ゴム被覆コードの巻付け終端部を示す説明図である。

【図11】巻付けドラムに成形された筒状体を示す説明図である。

【図12】切断された筒状体を下ろして展開する状態を示す説明図である。

【図13】巻付けドラムの他の例を示す断面図である。

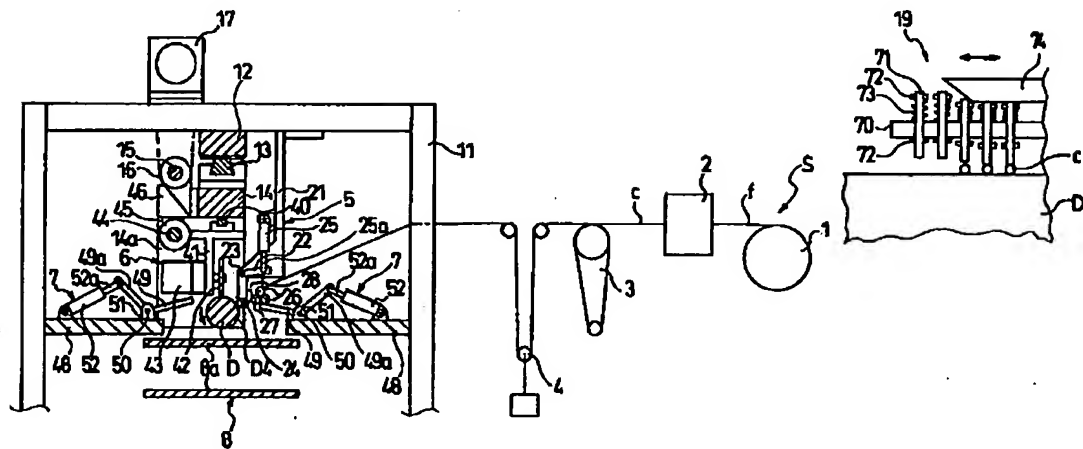
【図14】図13の巻付けドラムに巻き付けたゴム被覆コードを展開して示す説明図である。

【符号の説明】

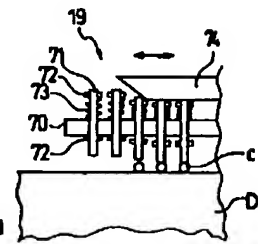
- | | |
|------------|-----------|
| 1 レットオフ | 2 ゴム被覆装置 |
| 3 送り装置 | 4 ダンサーローラ |
| 5 コード巻付け手段 | 6 切断装置 |

- | | | | |
|------------|------------|------------------------------|----------|
| 7 取外し展開手段 | 8 搬送手段 | * D4 巻付け面 | D5 溝部 |
| 8a コンベアベルト | 12 ガイド部材 | N 筒状体 | N' 切断筒状体 |
| 14 移動体 | 15 ボールネジ | L 切断ライン | S 供給手段 |
| 19 押さえ手段 | 22 アーム部材 | c ゴム被覆コード | |
| 24 圧着ローラ | 41 支持体 | c ₁ 先端 (巻付け開始端) | |
| 42 カッター | 44 ボールネジ | c ₂ 先端部 (巻付け開始端部) | |
| 49 押さえ部材 | 80 先端部保持手段 | c ₃ 巻付け終了端 | |
| 90 コード切断手段 | D 巻付けドラム | f スチールコード (補強コード) | |
| D1 ドラム片 | D2 連結部 | * | |

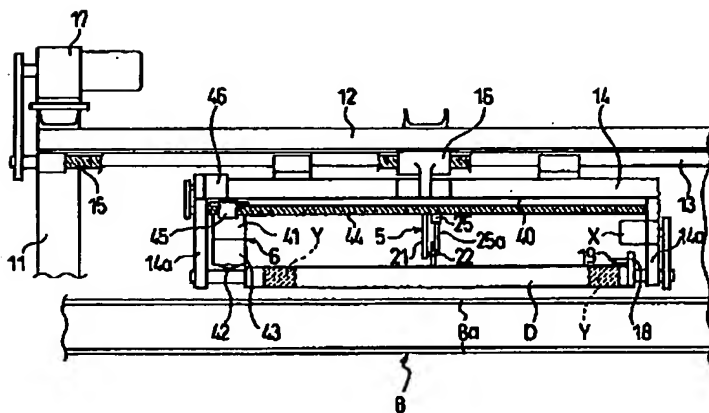
【図1】



【図5】

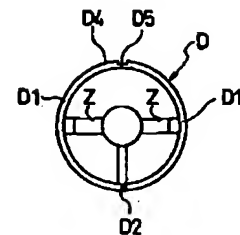


【図2】

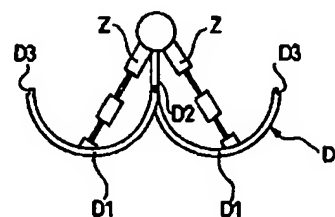


【図3】

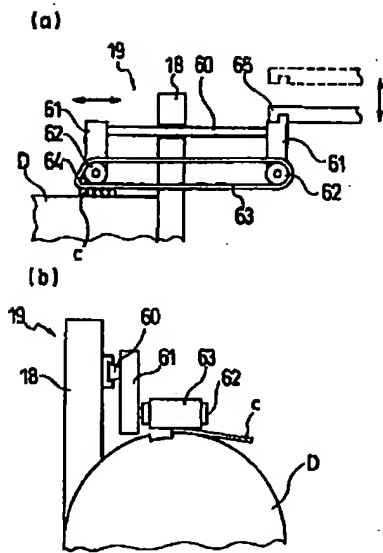
(a)



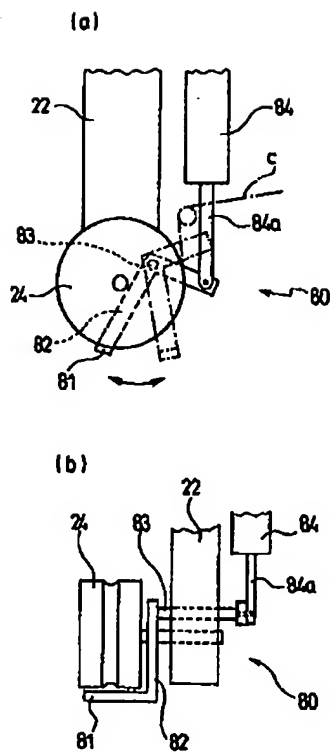
(b)



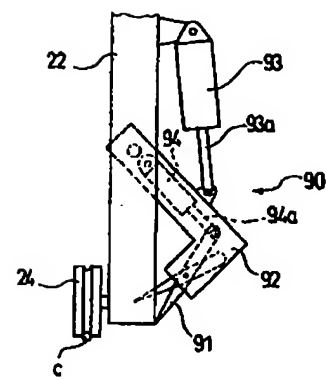
【図4】



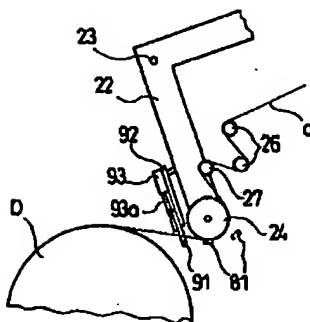
【図6】



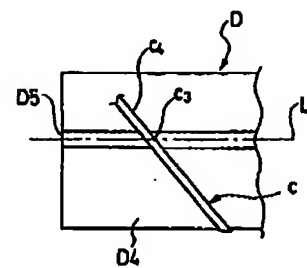
【図7】



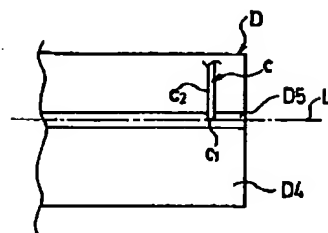
【図8】



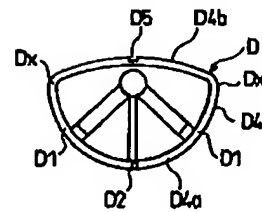
【図10】



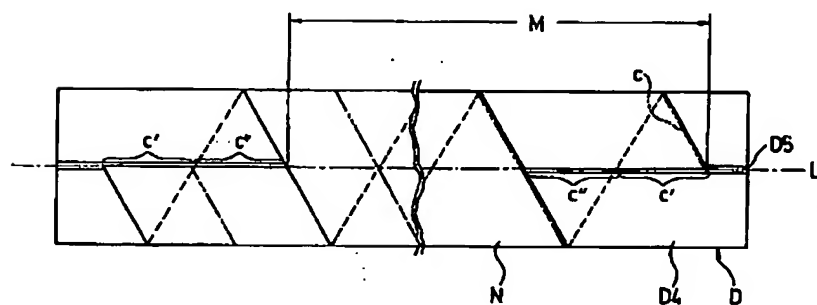
【図9】



【図13】



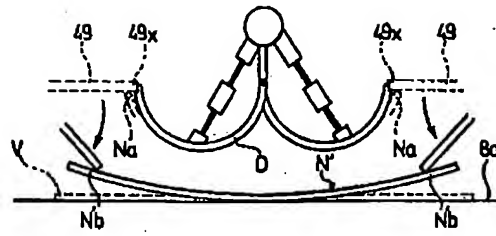
【図11】



【図14】



【図12】



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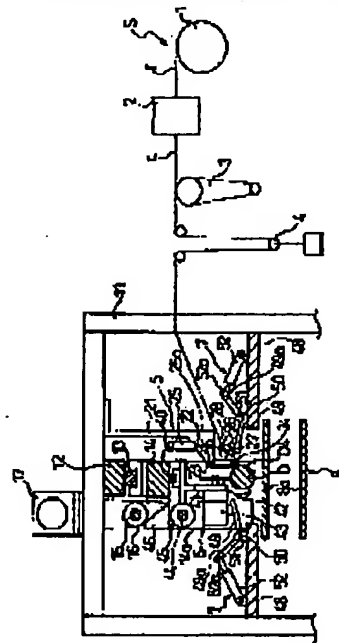
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(54) PROCESS AND APPARATUS FOR MAKING BELT MEMBER OF PNEUMATIC RADIAL TIRE

(57)Abstract:

PROBLEM TO BE SOLVED: To solve troubles such as the stock spaces of the belt member for every specification of a tire and scraps of member and realize an efficient multikind and small quantity production.

SOLUTION: A rubber-covered cord (c) is successively and spirally wound around a winding drum D by the length corresponding to the peripheral length of a belt so as to locate the winding starting end and the winding ending end of the cord on the axially extending cutting line on the winding drum D in order to produce a cylinder formed by spirally arranging the rubber-covered cord (c) on the winding drum D. Next, the cylinder is cut along the cutting line so as to remove the cut cylinder from the winding drum in order to develop the cut cylinder into a flat plane so as to obtain a belt member.



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CLAIMS

[Claim(s)]

[Claim 1] A belt member forming process of a radial-ply tire containing air characterized by comprising the following.

A process of only length corresponding to belt peripheral length twisting a rubber coated cord around this volume attachment drum one by one spirally so that it may be located on the cutting line which it twists, and twists with start ends, and a terminal end twists, and extends in shaft orientations of a drum, and fabricating said tube-like object which twisted and arranged a rubber coated cord spirally to drum lifting.

A process of cutting this tube-like object along said cutting line.

A process of fabricating a belt member which made an amputation stump a belt width direction for said cut tube-like object by [said] twisting, removing from a drum and developing planate.

[Claim 2] A belt member forming process of the radial-ply tire containing air according to claim 1 characterized by comprising the following.

One continuous rubber coated cord twists, a process of fabricating said tube-like object locates start ends on said cutting line, and makes and twists them, and it is said process which is twisted and is held to drum lifting about a start-ends part.

A process around which only length corresponding to belt peripheral length twists said rubber coated cord spirally by [said] twisting, and moving a drum to the shaft orientations, and making it rotate.

A process which is twisted and is cut in end position of becoming said cutting line top about said rubber coated cord.

A process repeated until said cut rubber coated cord twists, only rubber coated cord width shifts a start-ends position and said tube-like object is fabricated in said three processes.

[Claim 3] a rubber coated cord is twisted -- twisting and a drum being installed horizontally in rotation and shaft orientations so that reciprocation moving is possible, and. Centering on a lower end, it constitutes from 2 block construction so that opening and closing are possible, and between this volume attachment drum and a feeding means which supplies a rubber coated cord, a tip part of this rubber coated cord can be held, and it can press to this volume attachment drum, And to the aforementioned volume attachment drum, a code volume attachment means by which this rubber coated cord can be cut is installed so that an attitude is possible, Said removal means which removes a tube-like object of said rubber coated cord which twisted and was cut from a drum when [said] it twists and a drum is in an opened state while twisting and opposite-*(ing) to a drum a cutter in which reciprocation moving is possible along the shaft orientations, Belt member molding equipment of a radial-ply tire containing air which installed an expanding means which extends a removed cut tube-like object planate.

[Claim 4] Belt member molding equipment of said radial-ply tire containing air according to claim 3 with circular longitudinal plane shape of a field in which twist and a drum twists.

[Claim 5] Said belt member molding equipment of the radial-ply tire containing air according to claim 3 with which it twists, a drum twists, longitudinal plane shape of a field has a flection right and left, and length between both flections differs by one side and the other side.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the belt member forming process and device of the radial-ply tire containing air which can produce a wide variety in limited amounts efficiently in more detail about the forming process and device of a belt member which are used for the radial-ply tire containing air.

[0002]

[Description of the Prior Art]Generally the belt layer of the radial-ply tire containing air, The band form of the double width which carried out the calendar process pulled out from the creel stand so that a book may subtract a large number, it may arrange and a reinforcement cord may be impregnated in an unvulcanized rubber A predetermined angle, A bias cut is carried out at width, it joins together so that it may become an edge section of right and left [the cut-this belt piece by which the bias cut was carried out side], it is made long belt material, and it is rolled round to a drum and is once stocked. Belt material is pulled out from a drum at the time of belt layer shaping, and he cuts in the direction which meets the length equivalent to the peripheral length of a belt layer at a reinforcement cord, and is trying to obtain a belt member.

[0003]However, since width and length differ from an angle according to tire sizes, the belt member fabricated as mentioned above needs to stock the belt material from which a size is different for every tire specification. Therefore, in order to prepare the belt material of various sorts extremely, there was a problem of requiring a large stock space. Since the belt material of other tire specifications was not able to be diverted to some other purpose, in a tire process of production, the end scale occurred in the belt material for every tire specification, and there was a problem of material having become useless or requiring a processing man day. When a wide variety was produced in limited amounts, whenever it changed tire specification, there was a problem that it was necessary to do frequently the large-scale plan substitute work which exchanges the drum which rolled round long belt material.

[0004]

[Problem(s) to be Solved by the Invention]The purpose of this invention is to provide the belt member forming process and device of the radial-ply tire containing air which can solve the stock space of the belt material for every tire specification, and the problem of an end scale, and can produce a wide variety in limited amounts efficiently.

[0005]

[Means for Solving the Problem]A belt member forming process of a radial-ply tire containing air of this invention which attains the above-mentioned purpose comprises:

A process of only length corresponding to belt peripheral length twisting a rubber coated cord around this volume attachment drum one by one spirally so that it may be located on the cutting line which it twists, and twists with start ends, and a terminal end twists, and extends in shaft orientations of a drum, and fabricating said tube-like object which twisted and arranged a rubber coated cord spirally to drum lifting.

A process of cutting this tube-like object along said cutting line.

A process of fabricating a belt member which made an amputation stump a belt width direction for said cut tube-like object by [said] twisting, removing from a drum and developing planate.

[0006]Belt member molding equipment of a radial-ply tire containing air of this invention, a rubber coated cord is twisted -- twisting and a drum being installed horizontally in rotation and shaft orientations so that reciprocation moving is possible, and. Centering on a lower end, it constitutes from 2 block construction so that opening and closing are possible, and between this volume

attachment drum and a feeding means which supplies a rubber coated cord, a tip part of this rubber coated cord can be held, and it can press to this volume attachment drum, And to the aforementioned volume attachment drum, a code volume attachment means by which this rubber coated cord can be cut is installed so that an attitude is possible, Said removal means which removes a tube-like object of said rubber coated cord which twisted and was cut from a drum when [said] it twists and a drum is in an opened state while twisting and opposite-**(ing) to a drum a cutter in which reciprocation moving is possible along the shaft orientations, An expanding means which extends a removed cut tube-like object planate was installed.

[0007] Thus, use a rubber coated cord, twist it, twist with start ends, and a terminal end is made to come on a cutting line, Since twist, it twists around a drum one by one spirally, a tube-like object is fabricated and a belt member was fabricated by cutting it and developing, When fabricating a belt member from which a size is different with tire specification, for example, a belt member from which belt width is the same as and belt peripheral length differs, In fabricating a belt member from which it can respond by changing length which twists a rubber coated cord, and belt width differs, Since drum peripheral length is the same as belt width, it can respond by twisting and exchanging drums, and when changing a cord angle of a belt member, it can respond by twisting and changing a contact angle of a rubber coated cord to a drum further.

[0008] Therefore, production of a belt member of tire sizes of various sorts is attained without preparing belt material for every tire specification like before, and a wide variety can be produced in limited amounts efficiently, without eliminating a stock space and doing large-scale plan substitute work. Since a belt member is made from a rubber coated cord, generating of an end scale can be reduced extremely.

[0009]

[Embodiment of the Invention] Hereafter, it explains in detail, referring to an attached drawing for the composition of this invention. Drawing 1 and 2 show an example of the belt member molding equipment of the radial-ply tire containing air of this invention. The let-off when 1 supplies the steel cord f used as a reinforcement cord of a belt member, A rubber covering apparatus which 2 covers the steel cord f with an unvulcanized rubber, and is fabricated to rubber coated cord c, A feed gear which conveys to the front rubber coated cord c which 3 pulled out the steel cord f from the let-off 1, and was formed with the rubber covering apparatus 2, 4 is a dancer roll which it twists with the feed rate of the feed gear 3, and the drum D twists, and adjusts a difference with speed, and constitutes the feeding means S which these are installed one by one and supplies rubber coated cord c.

[0010] 5 can hold and twist the tip part of rubber coated cord c, and can press it to the drum D, And a code volume attachment means by which rubber coated cord c can be cut, a cutting device which cuts the tube-like object which 6 twisted, twisted rubber coated cord c without the crevice on the drum D, and was fabricated, The removal expanding means which 7 removes the cut tube-like object, and is extended planate, and is used as a belt member, and 8 are transportation means which convey a belt member.

[0011] The mobile 14 is attached to the lower end surface of the one guide member 12 supported at a level with the upper part of the set-up holding frame 11 along with the guide member 12 via the linear motion bearing 13, enabling free reciprocation moving. The ball screw 15 prolonged along with the guide member 12 is supported by the upper part of the holding frame 11, enabling free rotation, and the MENEJI part 16 which protruded on the mobile 14 is screwing in this ball screw 15. The ball screw 15 rotates and it has come to be able to carry out the reciprocation moving of the mobile 14 along with the guide member 12 by the drive of the motor 17 attached on the holding frame 11. between the biped parts 14a which hung to the side part of the mobile 14 prolonged along with the guide member 12, it extends horizontally along with the guide member 12 -- it twists and is supported, enabling rotation the drum D being able to detach and attach freely and free. It can be rotated now by the drum D by this motor X that twisted and was attached to one leg 14a.

[0012] Twist and the drum D is formed cylindrical, and as shown in drawing 3, it is constituted by right-and-left 2 block construction, and opening and closing have become possible in 2 step-type cylinder Z at right and left focusing on the connecting part D2 of the lower end part which connects the piece D1 of a drum of the right and left. The notch D3 is formed in the upper bed part (the connecting part D2 and the end of an opposite hand) of the piece D1 of both drums along a drum axial direction, when it is in the closed state of drawing 3 (a), both the notches D3 twist and the concave slot D5 is formed to drum both ends to the field D4. It enables it to hold rubber coated cord c which twisted, the unillustrated electromagnetic magnet etc. were allocated in the drum D, twisted, and was twisted around the drum D. It twists and the dashed line slash part Y of the drum D is a **

arrival field of a magnet. In order to stop the tip part and rear end part of rubber coated cord c, this ** arrival field is twisted at least, is arranged to the both ends of the drum D, and is twisted if needed, and it may be made to arrange it in the center section of the drum D.

[0013]It twists, and the tip part of rubber coated cord c is twisted via the flange 18, and a presser-foot means 19 to press down and hold on the drum D is formed in the end side of the drum D. This presser-foot means 19 can be constituted like drawing 4. In drawing 4, the guide 60 twists around the flange 18 and the roller 62 of the couple is slidably supported by the shaft orientations of the drum D pivotable via the support member 61, respectively to an eclipse with ****, and the both ends of this guide 60. Rubber coated cord c which the annular belt 63 which has a sponge-like peripheral face was hung about on the roller 62 of a couple, and this belt 63 twisted, and has been arranged on the drum D is suppressed. This makes the covering code c easy to insert the roller 64 of a byway in the side of the roller 62, and to press down. The drive rod 65 is connected with one support member 61 as a means which twists the belt 63 and is moved to the shaft orientations of the drum D. The attitude of this drive rod 65 is attained to the support member 61.

[0014]According to the presser-foot means 19 of the Caterpillar structure shown in drawing 4, it can twist and can suppress rubber coated cord c on the drum D at a time to one with the belt 63. It twists, and during rotation of the drum D, it changes into the state where the tip part of rubber coated cord c was suppressed by the belt 63, and connection to the support member 61 and the drive rod 65 is canceled. Since the belt 63 has a sponge-like peripheral face, even if it separates the drive rod 65, the locked state of rubber coated cord c is held.

[0015]The presser-foot means 19 may be constituted like drawing 5. In drawing 5, it twists around the support plate 70 extended from the flange 18, two or more breakthroughs are provided along the shaft orientations of the drum D, and the rod 71 is inserted in each breakthrough. It has the heights 72 to both ends so that these rods 71 may not escape from a breakthrough, and the spring 73 is inserted in the back end side between the support plate 70 and the heights 72. It twists around the back end side of the rod 71, and the rod presser foot 74 which can move to the shaft orientations of the drum D and has an inclined plane at a tip is arranged, it is pushed on this rod presser foot 74, the tip part of the rod 71 twists, and it projects to the drum D side. According to the presser-foot means 19 shown in this drawing 5, it can twist and can suppress rubber coated cord c on the drum D at a time to one with the rod 71.

[0016]The code volume attachment means 5 is twisted and is installed between the drum D and the feeding means S. This code volume attachment means 5 equips with the ****-like arm member 22 the lower end part of the support member 21 which hung from the upper part of the holding frame 11. A flection is connected with the support member 21 by the pin 23, and rotation of this arm member 22 is attained focusing on the pin 23. The sticking-by-pressure roller 24 which twists rubber coated cord c and is pushed on the drum D is supported by the lower end part of the arm member 22, enabling free rotation. It is connected with the upper bed part of the arm member 22 by the tip part of the rod 25a which projects from the air cylinder 25 attached to the support member 21, and by elasticity of the rod 25a. the crimped position which the sticking-by-pressure roller 24 twists, and the drum D twists, and forces rubber coated cord c on the field D4, and the alienation which twisted and is separated from the drum D -- between positions is made to have moved Setting to the upper part is preferred as this crimped position can approach the presser-foot means 19. 26 and 27 are the guide idlers for leading rubber coated cord c to the sticking-by-pressure roller 24, and are supported by the bracket 28 which protruded on the arm member 22, enabling free rotation.

[0017]The tip part holding mechanism 80 for holding the tip part of rubber coated cord c and the code cutting means 90 which cuts rubber coated cord c are formed in the support member 21, respectively. The tip part holding mechanism 80 can be constituted like drawing 6. In drawing 6, the arm member 82 which pressed down in the lower part of the arm member 22, and was provided with the board 81 is attached to the position [axis of rotation / of the sticking-by-pressure roll 24] shifted focusing on the pin 83, enabling free rotation. The tip part of the rod 84a which projects from the air cylinder 84 attached to the arm member 22 is connected with this arm member 82, Press down by **** of the air cylinder 84, contact the board 81 on the sticking-by-pressure roll 24, hold rubber coated cord c, press down by the return of the air cylinder 84, the board 81 is made to estrange from the sticking-by-pressure roll 24, and the free rotation of the sticking-by-pressure roll 24 is permitted. If the sticking-by-pressure roll 24 is twisted in the cylinder 25 by **** of the air cylinder 84 and it presses down to the drum D, it will press down by the thrust of the cylinder 25 and the board 81 will be put back to a proper position.

[0018]On the other hand, the code cutting means 90 can be constituted like drawing 7. In drawing 7, the arm member 92 provided with the cutter 91 which has scissors structure is attached to the lower

end part of the arm member 22, enabling free rocking. The tip part of the rod 93a which projects from the air cylinder 93 attached to the arm member 22 is connected with this arm member 92. Twist the cutter 91 with the sticking-by-pressure roll 24 by **** of the air cylinder 93, and it is made to move to the code supply route between the drums D, and is made to move to the position which separates from the cutter 91 from a code supply route in the return of the air cylinder 93. The air cylinder 94 is carried in the arm member 92, the tip part of the rod 94a is connected with the cutter 91, and cutting by the cutter 91 is performed by **** of the air cylinder 94.

[0019]The tip part holding mechanism 80 and the code cutting means 90 which were mentioned above are set up perform the following operations. If rubber coated cord c finishes winding as shown in drawing 8, by operation of the air cylinder 25, the sticking-by-pressure roll 24 will be twisted and will separate from the drum D. At this time, the cutter 91 of the code cutting means 90 moves to a code supply route by operation of the air cylinder 93, and rubber coated cord c enters between that edge. And after pressing down by operation of the air cylinder 84, and the board's 81 moving and fixing rubber coated cord c to the sticking-by-pressure roll 24, the cutter 91 closes by operation of the air cylinder 94, and rubber coated cord c is cut.

[0020]The above-mentioned cutting device 6 is formed in the mobile 14. This cutting device 6 has structure which equipped with the disc-like cutter 42 the lower end part of the T character-like base material 41 connected with the undersurface of the mobile 14 via the linear motion bearing 40. The cutter 42 is fixed to the axis of rotation of the drive motor 43 fixed to the lower end part of the base material 41, and it is pivotable by rotation of the drive motor 43. It is supported between the upper parts of the biped part 14a, enabling free rotation of the ball screw 44 prolonged along with the mobile 14 (twisting the drum D). The MENEJI part 45 provided in the upper bed part of the base material 41 screws in the ball screw 44, the ball screw 44 rotates by the drive of the motor 46 attached to the mobile 14, with the base material 41, the cutter 42 twists and reciprocation moving is carried out along the shaft orientations of the drum D. The cutter 42 is twisted, and passes along the slot D5 of the drum D, and the line which he is trying to cut the tube-like object which consists of rubber coated cord c in the slot D5, and connects the crosswise center of the slot D5 has become cutting line L.

[0021]It twists and the removal expanding means 7 on either side is installed in the both sides of the drum D, respectively. Tabular [which twists around the tip part on both the support plates 48 that protruded in the holding frame 11 inside horizontally, and is prolonged along the shaft orientations of the drum D] presses down, and the member 49 is formed. By the pin 50, the rear end part of the presser-foot member 49 is connected with the bracket 51 which protruded on the support plate 48, and rocking of it is attained focusing on the pin 50. The tip part of the arm piece 49a is fixed to the rear end part of the presser-foot member 49, it is connected with the rod 52a of the cylinder 52 arranged on the support plate 48 by the rear end part of the arm piece 49a, and by elasticity of the rod 52a. The presser-foot member 49 is rockable up and down focusing on the pin 50. The above-mentioned transportation means 8 which twists and conveys the belt member of the drum D which was caudad removed by the removal expanding means 7, and which was able to be extended planate is established. The inside 8a of a figure is the conveyor belt.

[0022]Hereafter, the device mentioned above explains the belt member forming process of this invention. An unvulcanized rubber is covered with the rubber covering apparatus 2 by the operation of the feed gear 3, and continuous molding of the one steel cord f pulled out from the let-off 1 is carried out to rubber coated cord c. This rubber coated cord c is sent to the code volume attachment means 5 through the dancer roll 4. If the tip part of rubber coated cord c is held by the tip part holding mechanism 80 of the code volume attachment means 5, the rod 25a of the cylinder 25 will develop, and as shown in drawing 9, tip (twisting start ends) c_1 . As it is located on cutting line L which twists and is prolonged in the shaft orientations of the drum D, tip part (twisting start-ends part) c_2 is twisted, and it is stuck to the drum D by pressure.

[0023]Subsequently, if it presses down and tip part c_2 of rubber coated cord c is held by the means 19, the tip part holding mechanism 80 will cancel maintenance. The motor 17 operates, the mobile 14 moves rightward [of drawing 2], and twists in connection with it, and the drum D moves in the direction. It twists by the drive of the motor X and, simultaneously with it, the drum D rotates in the direction of the arrow of drawing 1. While it twists and rubber coated cord c is pressed by the drum D with the sticking-by-pressure roller 24 by that cause, it is twisted spirally. By twisting and adjusting the movement speed A and the revolving speed B to shaft orientations of the drum D, contact angle theta to the shaft orientations of rubber coated cord c is adjusted. Incidentally, it is angle $\theta = \tan^{-1} B/A$ and this angle theta turns into an angle of gradient to the tire hoop direction of the

reinforcement cord of a belt member. If only the length (this length is also the length to which rubber coated cord c twists and it was made for terminal end c_3 to be located on cutting line L)

corresponding to belt peripheral length is twisted like drawing 10, the code cutting means 90 will advance and rubber coated cord c will be cut. Partial c_4 which rubber coated cord c is new, and the tip part holding mechanism 80 twists, and becomes a start-ends part in that case is held.

[0024]If it cuts, the cylinder 25 will **** and the sticking-by-pressure roller 24 and the tip part holding mechanism 80 will retreat. The tip part holding mechanism 80 is in the new state which twisted and held the start-ends part. Subsequently, the mobile 14 moves leftward [of drawing 2] by the operation of the motor 17, and it twists in connection with it, the drum D twists, and it moves to a starting position. The position turns into a position from which only the width of rubber coated cord c shifted to the right-hand side of the figure. and new like the above -- it twists, and as start ends are located on cutting line L, they adjoin and twist around rubber coated cord [which twisted, twisted the start-ends part, was stuck to the drum D by pressure, and was already twisted in the following rubber coated cord] c. By carrying out by repeating the above-mentioned volume attachment process, the tube-like object N which twisted and arranged rubber coated cord c spirally without a crevice on the drum D is fabricated (drawing 11). in addition -- in drawing 11, M is belt peripheral length and rubber coated cord c' from one flat knot to two or more responds to the belt peripheral length M -- other rubber coated cord c' -- ' -- 1 round -- being twisted mostly -- the -- it twists and the terminal end is located on cutting line L. c shown according to a two-dot chain line shows the state where the rubber coated cord of one flat knot was twisted.

[0025]If the tube-like object N is fabricated, it twists, the drum D rotates and cutting line L is located on the running line of the cutter 42. If the cutter 42 rotates by the operation of the drive motor 43 of the cutting means 6, the cutter 42 will run a cutting line L top with the base material 41 by the drive of the motor 46, and the tube-like object N will be cut. If it will twist, the drum D will be in an opened state and the electromagnetic magnet subsequently installed is come by off, the removal expanding means 7 on either side will perform removal operation of the cut tube-like object N, as shown in drawing 12. The rod 52a of the cylinder 52 develops, by it, the presser-foot member 49 moves caudad focusing on the pin 50, it presses against amputation stump Na of the tube-like object N which had the tip 49X cut, and the tube-like object cut on the conveyor belt 8a is taken down. By forcing further on the conveyor belt 8a both-ends N'b of cut tube-like object N' which curves to ** in a bow on this conveyor belt 8a by the presser-foot member 49, it changes into the state where it developed planate, and belt member V which made the amputation stump the belt width direction is fabricated. This belt member V has the conveyor-belt 8a top conveyed, and is supplied to an unillustrated belt molding drum.

[0026]In fabricating the belt member from which a size is different with tire specification, it carries out as follows. Belt width is the same, and in fabricating the belt member from which belt peripheral length differs, it corresponds by rubber coated cord c's twisting and changing length. In fabricating the belt member from which belt width differs, it corresponds by what (it has the same peripheral length as belt width twisting a drum use) it twists and are exchanged for the drum D. In changing the cord angle of a belt member, by twisting and adjusting the movement speed A and the revolving speed B to shaft orientations of the drum D, contact angle theta of rubber coated cord c is changed, and it corresponds. In changing the end count (arrangement density) of the reinforcement cord of a belt member, it changes the rubber amount which covers the steel cord f, and it can respond by changing the interval which puts rubber coated cord c in order.

[0027]Therefore, according to this invention, the stock of belt material with which a size is different for every tire specification becomes unnecessary, and there are also no worries about an end scale, and whenever it changes tire specification, a wide variety can be produced in limited amounts efficiently, without doing the large-scale plan substitute work which exchanges the drum which rolled round long belt material. Although it twisted at the time of cutting in the direction which twists and intersects perpendicularly to shaft orientations as the drum D and what has the circular longitudinal plane shape of the field D4 was used by the above-mentioned embodiment in this invention, It has the flection Dx right and left, and may be made for the length between both the flections Dx to use the thing it was made to differ by one side and the other side, as it replaces with it and is shown in drawing 13. By a diagram, one side twists, the other side twists and the field D4a is formed with the circle with a small path from the field D4b. The corner is cutting off the flection Dx on either side the corners with the small circle.

[0028]such -- by the center section and a side part, as shown in drawing 14 if it twists, and rubber coated cord c is twisted spirally and it is developed by use of the drum D. The angles of gradient of rubber coated cord c differ, and the angle of gradient to the direction from which the direction of the

center section which one side twisted and was twisted around the field D4a serves as a longitudinal direction (tire hoop direction) of a belt member becomes large. Therefore, shaping of the belt member which made the cord angle of the side part small is greatly attained in the cord angle of a center section. Since the end count of both ends increases more than a central end count (code number per unit width) and the rigidity of an edge part becomes high with the tire which uses this belt member, the belt member fabricated in this way can aim at a load noise and high speed durability improvement. When it is made the drum which the other side twisted, one side twisted the field D4b contrary to the figure, and the path formed with the small circle from the field D4a, The angle of gradient of rubber coated cord c becomes small, and the center section which one side twisted and was twisted around the field D4a can fabricate the belt member which enlarged the cord angle of the side part for the cord angle of the center section small.

[0029]By using rubber coated cord c which carried out rubber covering of the one steel cord f as mentioned above in this invention, Since the belt member of all the kinds from which a size is different for every tire specification can be fabricated, it is desirable, but it may be made to twist things which carried out rubber covering of two or more steel cords of a book, such as 2 and 3, as mentioned above. Although straight cut tube-like object N' which took down the tube-like object cut by the presser-foot member 49 to the above-mentioned embodiment, and was taken down on the conveyor belt 8a was made planate, Replace with it and only the process of taking down the tube-like object cut by the presser-foot member 49 is performed, The removal means of the tube-like object which opposite-~~ed~~ the pinch roller on the conveyor belt 8a by the side of conveyance, pressed down straight cut tube-like object N' which has the conveyor-belt 8a top conveyed by the pinch roller, could be made to make it planate, and was cut, The expanding means of the removed cut tube-like object may be established independently.

[0030]Although the above-mentioned embodiment showed the example of the steel cord as a code used for a rubber coated cord, as long as it is a code used for a belt member, it may be which reinforcement cord and a metaphor may use an organic fiber code like an aromatic polyamide fiber cord. In that case, what is necessary is to replace with and twist around the magnet mentioned above, and for the drum D to twist, to form many detailed holes in the field D4, and just to establish the adsorption means attracted from the inside, when twisting rubber coated cord c which twisted and was twisted around the drum D and holding on the field D4.

[0031]

[Effect of the Invention]As mentioned above, this invention a rubber coated cord so that it may be located on the cutting line which it twists, and twists with start ends, and a terminal end twists, and extends in the shaft orientations of a drum, Only the length corresponding to belt peripheral length is spirally twisted around this volume attachment drum one by one, Fabricate said tube-like object which twisted and arranged the rubber coated cord spirally without a crevice to drum lifting, cut this tube-like object along said cutting line, and said cut tube-like object by [said] twisting, removing from a drum and developing planate, Since the belt member which made the amputation stump the belt width direction is fabricated, the stock space of the belt member for every tire specification and the problem of an end scale can be solved, and a wide variety can be produced in limited amounts efficiently.

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TECHNICAL FIELD

[Field of the Invention]This invention relates to the belt member forming process and device of the radial-ply tire containing air which can produce a wide variety in limited amounts efficiently in more detail about the forming process and device of a belt member which are used for the radial-ply tire containing air.

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PRIOR ART

[Description of the Prior Art]Generally the belt layer of the radial-ply tire containing air, The band form of the double width which carried out the calendar process pulled out from the creel stand so that a book may subtract a large number, it may arrange and a reinforcement cord may be impregnated in an unvulcanized rubber A predetermined angle, A bias cut is carried out at width, it joins together so that it may become an edge section of right and left [the cut-this belt piece by which the bias cut was carried out side], it is made long belt material, and it is rolled round to a drum and is once stocked. Belt material is pulled out from a drum at the time of belt layer shaping, and he cuts in the direction which meets the length equivalent to the peripheral length of a belt layer at a reinforcement cord, and is trying to obtain a belt member.

[0003]However, since width and length differ from an angle according to tire sizes, the belt member fabricated as mentioned above needs to stock the belt material from which a size is different for every tire specification. Therefore, in order to prepare the belt material of various sorts extremely, there was a problem of requiring a large stock space. Since the belt material of other tire specifications was not able to be diverted to some other purpose, in a tire process of production, the end scale occurred in the belt material for every tire specification, and there was a problem of material having become useless or requiring a processing man day. When a wide variety was produced in limited amounts, whenever it changed tire specification, there was a problem that it was necessary to do frequently the large-scale plan substitute work which exchanges the drum which rolled round long belt material.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention]As mentioned above, by this invention, a rubber coated cord so that it may be located on the cutting line which it twists, and twists with start ends, and a terminal end twists, and extends in the shaft orientations of a drum, Only the length corresponding to belt peripheral length is spirally twisted around this volume attachment drum one by one, Said tube-like object which twisted and arranged the rubber coated cord spirally without a crevice to drum lifting is fabricated, this tube-like object is cut along said cutting line, and the belt member which made the amputation stump the belt width direction for said cut tube-like object by [said] twisting, removing from a drum and developing planate is fabricated.

Therefore, the stock space of the belt member for every tire specification and the problem of an end scale can be solved, and a wide variety can be produced in limited amounts efficiently.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]The purpose of this invention is to provide the belt member forming process and device of the radial-ply tire containing air which can solve the stock space of the belt material for every tire specification, and the problem of an end scale, and can produce a wide variety in limited amounts efficiently.

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MEANS

[Means for Solving the Problem]A belt member forming process of a radial-ply tire containing air of this invention which attains the above-mentioned purpose comprises:

A process of only length corresponding to belt peripheral length twisting a rubber coated cord around this volume attachment drum one by one spirally so that it may be located on the cutting line which it twists, and twists with start ends, and a terminal end twists, and extends in shaft orientations of a drum, and fabricating said tube-like object which twisted and arranged a rubber coated cord spirally to drum lifting.

A process of cutting this tube-like object along said cutting line.

A process of fabricating a belt member which made an amputation stump a belt width direction for said cut tube-like object by [said] twisting, removing from a drum and developing planate.

[0006]Belt member molding equipment of a radial-ply tire containing air of this invention, a rubber coated cord is twisted -- twisting and a drum being installed horizontally in rotation and shaft orientations so that reciprocation moving is possible, and. Centering on a lower end, it constitutes from 2 block construction so that opening and closing are possible, and between this volume attachment drum and a feeding means which supplies a rubber coated cord, a tip part of this rubber coated cord can be held, and it can press to this volume attachment drum, And to the aforementioned volume attachment drum, a code volume attachment means by which this rubber coated cord can be cut is installed so that an attitude is possible, Said removal means which removes a tube-like object of said rubber coated cord which twisted and was cut from a drum when [said] it twists and a drum is in an opened state while twisting and opposite-**(ing) to a drum a cutter in which reciprocation moving is possible along the shaft orientations, An expanding means which extends a removed cut tube-like object planate was installed.

[0007]Thus, use a rubber coated cord, twist it, twist with start ends, and a terminal end is made to come on a cutting line, Since twist, it twists around a drum one by one spirally, a tube-like object is fabricated and a belt member was fabricated by cutting it and developing, When fabricating a belt member from which a size is different with tire specification, for example, a belt member from which belt width is the same as and belt peripheral length differs, In fabricating a belt member from which it can respond by changing length which twists a rubber coated cord, and belt width differs, Since drum peripheral length is the same as belt width, it can respond by twisting and exchanging drums, and when changing a cord angle of a belt member, it can respond by twisting and changing a contact angle of a rubber coated cord to a drum further.

[0008]Therefore, production of a belt member of tire sizes of various sorts is attained without preparing belt material for every tire specification like before, and a wide variety can be produced in limited amounts efficiently, without eliminating a stock space and doing large-scale plan substitute work. Since a belt member is made from a rubber coated cord, generating of an end scale can be reduced extremely.

[0009]

[Embodiment of the Invention]Hereafter, it explains in detail, referring to an attached drawing for the composition of this invention. Drawing 1 and 2 show an example of the belt member molding equipment of the radial-ply tire containing air of this invention. The let-off when 1 supplies the steel cord f used as a reinforcement cord of a belt member, A rubber covering apparatus which 2 covers the steel cord f with an unvulcanized rubber, and is fabricated to rubber coated cord c, A feed gear which conveys to the front rubber coated cord c which 3 pulled out the steel cord f from the let-off 1, and was formed with the rubber covering apparatus 2, 4 is a dancer roll which it twists with the feed rate of the feed gear 3, and the drum D twists, and adjusts a difference with speed, and constitutes the feeding means S which these are installed one by one and supplies rubber coated

cord c.

[0010]5 can hold and twist the tip part of rubber coated cord c, and can press it to the drum D. And a code volume attachment means by which rubber coated cord c can be cut, a cutting device which cuts the tube-like object which 6 twisted, twisted rubber coated cord c without the crevice on the drum D, and was fabricated, The removal expanding means which 7 removes the cut tube-like object, and is extended planate, and is used as a belt member, and 8 are transportation means which convey a belt member.

[0011]The mobile 14 is attached to the lower end surface of the one guide member 12 supported at a level with the upper part of the set-up holding frame 11 along with the guide member 12 via the linear motion bearing 13, enabling free reciprocation moving. The ball screw 15 prolonged along with the guide member 12 is supported by the upper part of the holding frame 11, enabling free rotation, and the MENEJI part 16 which protruded on the mobile 14 is screwing in this ball screw 15. The ball screw 15 rotates and it has come to be able to carry out the reciprocation moving of the mobile 14 along with the guide member 12 by the drive of the motor 17 attached on the holding frame 11. between the biped parts 14a which hung to the side part of the mobile 14 prolonged along with the guide member 12, it extends horizontally along with the guide member 12 — it twists and is supported, enabling rotation the drum D being able to detach and attach freely and free. It can be rotated now by the drum D by this motor X that twisted and was attached to one leg 14a.

[0012]Twist and the drum D is formed cylindrical, and as shown in drawing 3, it is constituted by right-and-left 2 block construction, and opening and closing have become possible in 2 step-type cylinder Z at right and left focusing on the connecting part D2 of the lower end part which connects the piece D1 of a drum of the right and left. The notch D3 is formed in the upper bed part (the connecting part D2 and the end of an opposite hand) of the piece D1 of both drums along a drum axial direction, when it is in the closed state of drawing 3 (a), both the notches D3 twist and the concave slot D5 is formed to drum both ends to the field D4. It enables it to hold rubber coated cord c which twisted, the unillustrated electromagnetic magnet etc. were allocated in the drum D, twisted, and was twisted around the drum D. It twists and the dashed line slash part Y of the drum D is a ** arrival field of a magnet. In order to stop the tip part and rear end part of rubber coated cord c, this ** arrival field is twisted at least, is arranged to the both ends of the drum D, and is twisted if needed, and it may be made to arrange it in the center section of the drum D.

[0013]It twists, and the tip part of rubber coated cord c is twisted via the flange 18, and a presser-foot means 19 to press down and hold on the drum D is formed in the end side of the drum D. This presser-foot means 19 can be constituted like drawing 4. In drawing 4, the guide 60 twists around the flange 18 and the roller 62 of the couple is slidably supported by the shaft orientations of the drum D pivotable via the support member 61, respectively to an eclipse with ****, and the both ends of this guide 60. Rubber coated cord c which the annular belt 63 which has a sponge-like peripheral face was hung about on the roller 62 of a couple, and this belt 63 twisted, and has been arranged on the drum D is suppressed. This makes the covering code c easy to insert the roller 64 of a byway in the side of the roller 62, and to press down. The drive rod 65 is connected with one support member 61 as a means which twists the belt 63 and is moved to the shaft orientations of the drum D. The attitude of this drive rod 65 is attained to the support member 61.

[0014]According to the presser-foot means 19 of the Caterpillar structure shown in drawing 4, it can twist and can suppress rubber coated cord c on the drum D at a time to one with the belt 63. It twists, and during rotation of the drum D, it changes into the state where the tip part of rubber coated cord c was suppressed by the belt 63, and connection to the support member 61 and the drive rod 65 is canceled. Since the belt 63 has a sponge-like peripheral face, even if it separates the drive rod 65, the locked state of rubber coated cord c is held.

[0015]The presser-foot means 19 may be constituted like drawing 5. In drawing 5, it twists around the support plate 70 extended from the flange 18, two or more breakthroughs are provided along the shaft orientations of the drum D, and the rod 71 is inserted in each breakthrough. It has the heights 72 to both ends so that these rods 71 may not escape from a breakthrough, and the spring 73 is inserted in the back end side between the support plate 70 and the heights 72. It twists around the back end side of the rod 71, and the rod presser foot 74 which can move to the shaft orientations of the drum D and has an inclined plane at a tip is arranged, it is pushed on this rod presser foot 74, the tip part of the rod 71 twists, and it projects to the drum D side. According to the presser-foot means 19 shown in this drawing 5, it can twist and can suppress rubber coated cord c on the drum D at a time to one with the rod 71.

[0016]The code volume attachment means 5 is twisted and is installed between the drum D and the feeding means S. This code volume attachment means 5 equips with the ****-like arm member 22

the lower end part of the support member 21 which hung from the upper part of the holding frame 11. A flection is connected with the support member 21 by the pin 23, and rotation of this arm member 22 is attained focusing on the pin 23. The sticking-by-pressure roller 24 which twists rubber coated cord c and is pushed on the drum D is supported by the lower end part of the arm member 22, enabling free rotation. It is connected with the upper bed part of the arm member 22 by the tip part of the rod 25a which projects from the air cylinder 25 attached to the support member 21, and by elasticity of the rod 25a. the crimped position which the sticking-by-pressure roller 24 twists, and the drum D twists, and forces rubber coated cord c on the field D4, and the alienation which twisted and is separated from the drum D — between positions is made to have moved Setting to the upper part is preferred as this crimped position can approach the presser-foot means 19. 26 and 27 are the guide idlers for leading rubber coated cord c to the sticking-by-pressure roller 24, and are supported by the bracket 28 which protruded on the arm member 22, enabling free rotation.

[0017]The tip part holding mechanism 80 for holding the tip part of rubber coated cord c and the code cutting means 90 which cuts rubber coated cord c are formed in the support member 21, respectively. The tip part holding mechanism 80 can be constituted like drawing 6. In drawing 6, the arm member 82 which pressed down in the lower part of the arm member 22, and was provided with the board 81 is attached to the position [axis of rotation / of the sticking-by-pressure roll 24] shifted focusing on the pin 83, enabling free rotation. The tip part of the rod 84a which projects from the air cylinder 84 attached to the arm member 22 is connected with this arm member 82, Press down by **** of the air cylinder 84, contact the board 81 on the sticking-by-pressure roll 24, hold rubber coated cord c, press down by the return of the air cylinder 84, the board 81 is made to estrange from the sticking-by-pressure roll 24, and the free rotation of the sticking-by-pressure roll 24 is permitted. If the sticking-by-pressure roll 24 is twisted in the cylinder 25 by **** of the air cylinder 84 and it presses down to the drum D, it will press down by the thrust of the cylinder 25 and the board 81 will be put back to a proper position.

[0018]On the other hand, the code cutting means 90 can be constituted like drawing 7. In drawing 7, the arm member 92 provided with the cutter 91 which has scissors structure is attached to the lower end part of the arm member 22, enabling free rocking. The tip part of the rod 93a which projects from the air cylinder 93 attached to the arm member 22 is connected with this arm member 92, Twist the cutter 91 with the sticking-by-pressure roll 24 by **** of the air cylinder 93, and it is made to move to the code supply route between the drums D, and is made to move to the position which separates from the cutter 91 from a code supply route in the return of the air cylinder 93. The air cylinder 94 is carried in the arm member 92, the tip part of the rod 94a is connected with the cutter 91, and cutting by the cutter 91 is performed by **** of the air cylinder 94.

[0019]The tip part holding mechanism 80 and the code cutting means 90 which were mentioned above are set up perform the following operations. If rubber coated cord c finishes winding as shown in drawing 8, by operation of the air cylinder 25, the sticking-by-pressure roll 24 will be twisted and will separate from the drum D. At this time, the cutter 91 of the code cutting means 90 moves to a code supply route by operation of the air cylinder 93, and rubber coated cord c enters between that edge. And after pressing down by operation of the air cylinder 84, and the board's 81 moving and fixing rubber coated cord c to the sticking-by-pressure roll 24, the cutter 91 closes by operation of the air cylinder 94, and rubber coated cord c is cut.

[0020]The above-mentioned cutting device 6 is formed in the mobile 14. This cutting device 6 has structure which equipped with the disc-like cutter 42 the lower end part of the T character-like base material 41 connected with the undersurface of the mobile 14 via the linear motion bearing 40. The cutter 42 is fixed to the axis of rotation of the drive motor 43 fixed to the lower end part of the base material 41, and it is pivotable by rotation of the drive motor 43. It is supported between the upper parts of the biped part 14a, enabling free rotation of the ball screw 44 prolonged along with the mobile 14 (twisting the drum D), The MENEJI part 45 provided in the upper bed part of the base material 41 screws in the ball screw 44, the ball screw 44 rotates by the drive of the motor 46 attached to the mobile 14, with the base material 41, the cutter 42 twists and reciprocation moving is carried out along the shaft orientations of the drum D. The cutter 42 is twisted, and passes along the slot D5 of the drum D, and the line which he is trying to cut the tube-like object which consists of rubber coated cord c in the slot D5, and connects the crosswise center of the slot D5 has become cutting line L.

[0021]It twists and the removal expanding means 7 on either side is installed in the both sides of the drum D, respectively. Tabular [which twists around the tip part on both the support plates 48 that protruded in the holding frame 11 inside horizontally, and is prolonged along the shaft orientations of the drum D] presses down, and the member 49 is formed. By the pin 50, the rear end part of the

presser-foot member 49 is connected with the bracket 51 which protruded on the support plate 48, and rocking of it is attained focusing on the pin 50. The tip part of the arm piece 49a is fixed to the rear end part of the presser-foot member 49, it is connected with the rod 52a of the cylinder 52 arranged on the support plate 48 by the rear end part of the arm piece 49a, and by elasticity of the rod 52a. The presser-foot member 49 is rockable up and down focusing on the pin 50. The above-mentioned transportation means 8 which twists and conveys the belt member of the drum D which was caudad removed by the removal expanding means 7, and which was able to be extended planate is established. The inside 8a of a figure is the conveyor belt.

[0022] Hereafter, the device mentioned above explains the belt member forming process of this invention. An unvulcanized rubber is covered with the rubber covering apparatus 2 by the operation of the feed gear 3, and continuous molding of the one steel cord f pulled out from the let-off 1 is carried out to rubber coated cord c. This rubber coated cord c is sent to the code volume attachment means 5 through the dancer roll 4. If the tip part of rubber coated cord c is held by the tip part holding mechanism 80 of the code volume attachment means 5, the rod 25a of the cylinder 25 will develop, and as shown in drawing 9, tip (twisting start ends) c_1 . As it is located on cutting line L which twists and is prolonged in the shaft orientations of the drum D, tip part (twisting start-ends part) c_2 is twisted, and it is stuck to the drum D by pressure.

[0023] Subsequently, if it presses down and tip part c_2 of rubber coated cord c is held by the means 19, the tip part holding mechanism 80 will cancel maintenance. The motor 17 operates, the mobile 14 moves rightward [of drawing 2], and twists in connection with it, and the drum D moves in the direction. It twists by the drive of the motor X and, simultaneously with it, the drum D rotates in the direction of the arrow of drawing 1. While it twists and rubber coated cord c is pressed by the drum D with the sticking-by-pressure roller 24 by that cause, it is twisted spirally. By twisting and adjusting the movement speed A and the revolving speed B to shaft orientations of the drum D, contact angle theta to the shaft orientations of rubber coated cord c is adjusted. Incidentally, it is angle $\theta = \tan^{-1} B/A$ and this angle theta turns into an angle of gradient to the tire hoop direction of the reinforcement cord of a belt member. If only the length (this length is also the length to which rubber coated cord c twists and it was made for terminal end c_3 to be located on cutting line L)

corresponding to belt peripheral length is twisted like drawing 10, the code cutting means 90 will advance and rubber coated cord c will be cut. Partial c_4 which rubber coated cord c is new, and the tip part holding mechanism 80 twists, and becomes a start-ends part in that case is held.

[0024] If it cuts, the cylinder 25 will **** and the sticking-by-pressure roller 24 and the tip part holding mechanism 80 will retreat. The tip part holding mechanism 80 is in the new state which twisted and held the start-ends part. Subsequently, the mobile 14 moves leftward [of drawing 2] by the operation of the motor 17, and it twists in connection with it, the drum D twists, and it moves to a starting position. The position turns into a position from which only the width of rubber coated cord c shifted to the right-hand side of the figure. and new like the above -- it twists, and as start ends are located on cutting line L, they adjoin and twist around rubber coated cord [which twisted, twisted the start-ends part, was stuck to the drum D by pressure, and was already twisted in the following rubber coated cord] c. By carrying out by repeating the above-mentioned volume attachment process, the tube-like object N which twisted and arranged rubber coated cord c spirally without a crevice on the drum D is fabricated (drawing 11). in addition -- in drawing 11, M is belt peripheral length and rubber coated cord c' from one flat knot to two or more responds to the belt peripheral length M -- other rubber coated cord c' -- ' -- 1 round -- being twisted mostly -- the -- it twists and the terminal end is located on cutting line L. c shown according to a two-dot chain line shows the state where the rubber coated cord of one flat knot was twisted.

[0025] If the tube-like object N is fabricated, it twists, the drum D rotates and cutting line L is located on the running line of the cutter 42. If the cutter 42 rotates by the operation of the drive motor 43 of the cutting means 6, the cutter 42 will run a cutting line L top with the base material 41 by the drive of the motor 46, and the tube-like object N will be cut. If it will twist, the drum D will be in an opened state and the electromagnetic magnet subsequently installed is come by off, the removal expanding means 7 on either side will perform removal operation of the cut tube-like object N, as shown in drawing 12. The rod 52a of the cylinder 52 develops, by it, the presser-foot member 49 moves caudad focusing on the pin 50, it presses against amputation stump Na of the tube-like object N which had the tip 49X cut, and the tube-like object cut on the conveyor belt 8a is taken down. By forcing further on the conveyor belt 8a both-ends N'b of cut tube-like object N' which curves to ** in a bow on this conveyor belt 8a by the presser-foot member 49, it changes into the state where it

developed planate, and belt member V which made the amputation stump the belt width direction is fabricated. This belt member V has the conveyor-belt 8a top conveyed, and is supplied to an unillustrated belt molding drum.

[0026]In fabricating the belt member from which a size is different with tire specification, it carries out as follows. Belt width is the same, and in fabricating the belt member from which belt peripheral length differs, it corresponds by rubber coated cord c's twisting and changing length. In fabricating the belt member from which belt width differs, it corresponds by what (it has the same peripheral length as belt width twisting a drum use) it twists and are exchanged for the drum D. In changing the cord angle of a belt member, by twisting and adjusting the movement speed A and the revolving speed B to shaft orientations of the drum D, contact angle theta of rubber coated cord c is changed, and it corresponds. In changing the end count (arrangement density) of the reinforcement cord of a belt member, it changes the rubber amount which covers the steel cord f, and it can respond by changing the interval which puts rubber coated cord c in order.

[0027]Therefore, according to this invention, the stock of belt material with which a size is different for every tire specification becomes unnecessary, and there are also no worries about an end scale, and whenever it changes tire specification, a wide variety can be produced in limited amounts efficiently, without doing the large-scale plan substitute work which exchanges the drum which rolled round long belt material. Although it twisted at the time of cutting in the direction which twists and intersects perpendicularly to shaft orientations as the drum D and what has the circular longitudinal plane shape of the field D4 was used by the above-mentioned embodiment in this invention, It has the flexion Dx right and left, and may be made for the length between both the flexions Dx to use the thing it was made to differ by one side and the other side, as it replaces with it and is shown in drawing 13. By a diagram, one side twists, the other side twists and the field D4a is formed with the circle with a small path from the field D4b. The corner is cutting off the flexion Dx on either side the corners with the small circle.

[0028]such — by the center section and a side part, as shown in drawing 14 if it twists, and rubber coated cord c is twisted spirally and it is developed by use of the drum D. The angles of gradient of rubber coated cord c differ, and the angle of gradient to the direction from which the direction of the center section which one side twisted and was twisted around the field D4a serves as a longitudinal direction (tire hoop direction) of a belt member becomes large. Therefore, shaping of the belt member which made the cord angle of the side part small is greatly attained in the cord angle of a center section. Since the end count of both ends increases more than a central end count (code number per unit width) and the rigidity of an edge part becomes high with the tire which uses this belt member, the belt member fabricated in this way can aim at a load noise and high speed durability improvement. When it is made the drum which the other side twisted, one side twisted the field D4b contrary to the figure, and the path formed with the small circle from the field D4a, The angle of gradient of rubber coated cord c becomes small, and the center section which one side twisted and was twisted around the field D4a can fabricate the belt member which enlarged the cord angle of the side part for the cord angle of the center section small.

[0029]By using rubber coated cord c which carried out rubber covering of the one steel cord f as mentioned above in this invention, Since the belt member of all the kinds from which a size is different for every tire specification can be fabricated, it is desirable, but it may be made to twist things which carried out rubber covering of two or more steel cords of a book, such as 2 and 3, as mentioned above. Although straight cut tube-like object N' which took down the tube-like object cut by the presser-foot member 49 to the above-mentioned embodiment, and was taken down on the conveyor belt 8a was made planate, Replace with it and only the process of taking down the tube-like object cut by the presser-foot member 49 is performed, The removal means of the tube-like object which opposite-*(ed) the pinch roller on the conveyor belt 8a by the side of conveyance, pressed down straight cut tube-like object N' which has the conveyor-belt 8a top conveyed by the pinch roller, could be made to make it planate, and was cut, The expanding means of the removed cut tube-like object may be established independently.

[0030]Although the above-mentioned embodiment showed the example of the steel cord as a code used for a rubber coated cord, as long as it is a code used for a belt member, it may be which reinforcement cord and a metaphor may use an organic fiber code like an aromatic polyamide fiber cord. In that case, what is necessary is to replace with and twist around the magnet mentioned above, and for the drum D to twist, to form many detailed holes in the field D4, and just to establish the adsorption means attracted from the inside, when twisting rubber coated cord c which twisted and was twisted around the drum D and holding on the field D4.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is an approximate account figure of the belt member molding equipment of the radial-ply tire containing air of this invention.

[Drawing 2] It is a left lateral explanatory view which demounts the important section of drawing 1 and is shown except for an expanding means.

[Drawing 3] (a) is a sectional view in which twisting around and showing the closed state of a drum, and a sectional view in which (b's) twisting around and showing the opened state of a drum.

[Drawing 4] The side view in which (a) shows an example of a presser-foot means, and (b) are the front view.

[Drawing 5] It is a side view showing other examples of a presser-foot means.

[Drawing 6] The side view in which (a) shows an example of tip part holding mechanism, and (b) are the front view.

[Drawing 7] It is a side view showing an example of a code cutting means.

[Drawing 8] It is an explanatory view showing operation of tip part holding mechanism and a code cutting means.

[Drawing 9] It is an explanatory view in which a rubber coated cord's twisting around and showing a start-ends part.

[Drawing 10] It is an explanatory view in which a rubber coated cord's twisting around and showing a terminal end.

[Drawing 11] It is an explanatory view showing the tube-like object which twisted and was fabricated by the drum.

[Drawing 12] It is an explanatory view showing the state of taking down the cut tube-like object and developing.

[Drawing 13] It is a sectional view in which twisting around and showing other examples of a drum.

[Drawing 14] It is an explanatory view developing and showing the rubber coated cord which drawing 13 twisted and was twisted around the drum.

[Description of Notations]

1 Let-off 2 rubber covering apparatus

3 Feed gear 4 dancer roll

5 Code volume attachment means 6 cutting device

7 Removal expanding means 8 transportation means

8a Conveyor-belt 12 guide member

14 Mobile 15 ball screw

19 Presser-foot means 22 arm member

24 Sticking-by-pressure roller 41 Base material

42 Cutter 44 Ball screw

49 Presser-foot member 80 tip-part holding mechanism

90 code cutting-means D Twist and it is a drum.

D1 Piece of a drum D2 connecting part

D4 It twists and is a field. D5 slot

N Tube-like object N' cut tube-like object

L Cutting line S feeding means

c Rubber coated cord

c₁ tip (twisting start ends)

c₂ tip part (twisting start-ends part)

It c₃ Twists and is a terminal end.

f' Steel cord (reinforcement cord)

[Translation done.]

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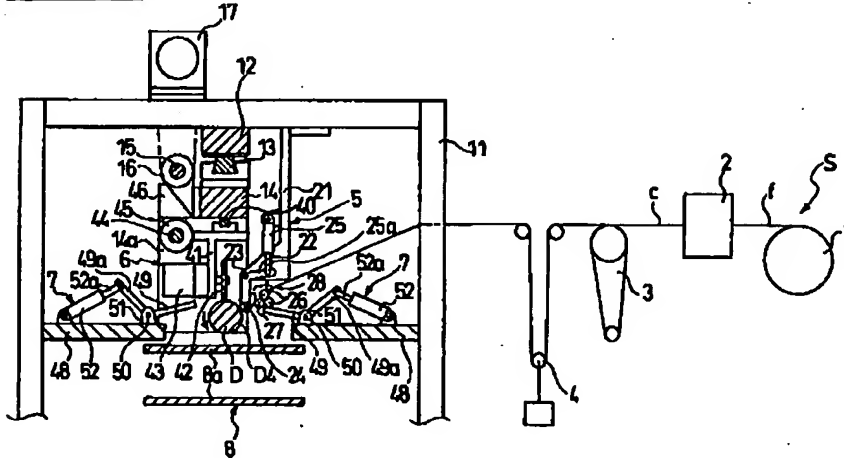
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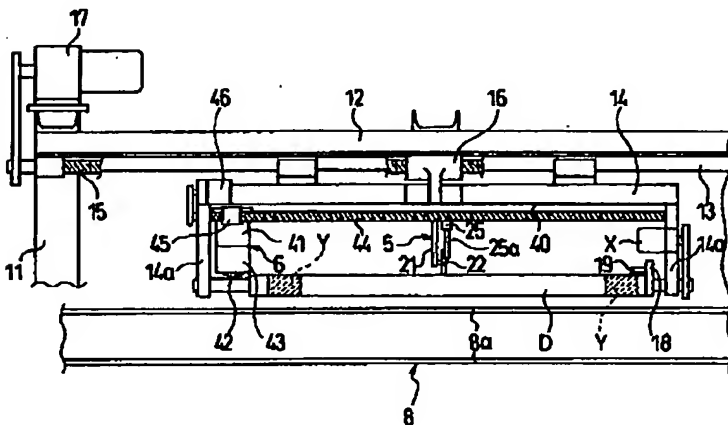
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DRAWINGS

[Drawing 1]

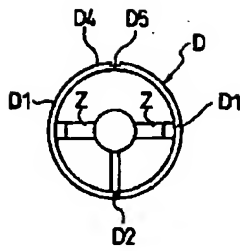


[Drawing 2]

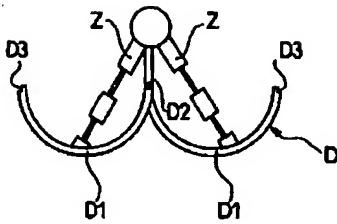


[Drawing 3]

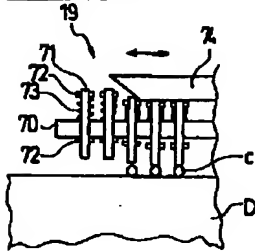
(a)



(b)

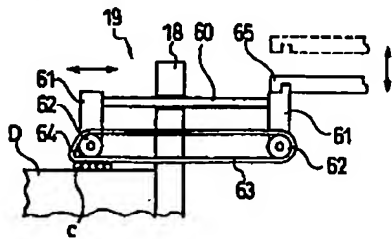


[Drawing 5]

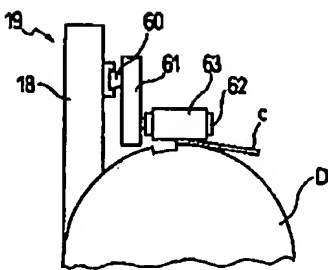


[Drawing 4]

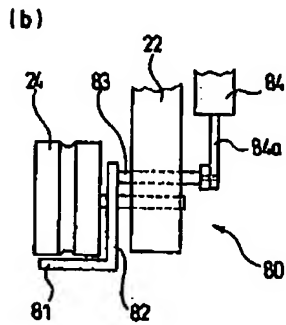
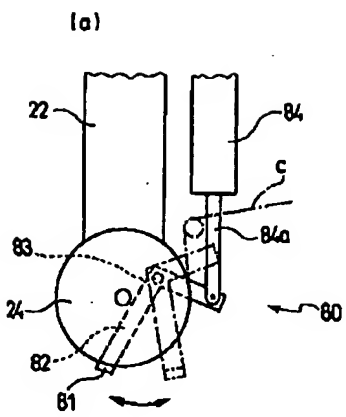
(a)



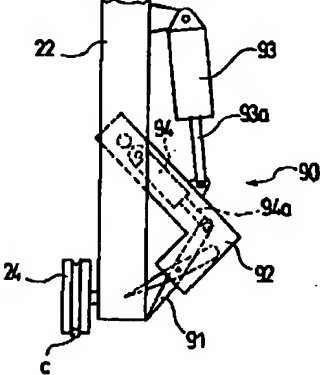
(b)



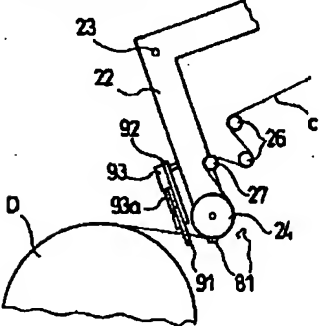
[Drawing 6]



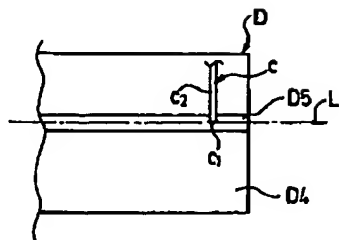
[Drawing 7]



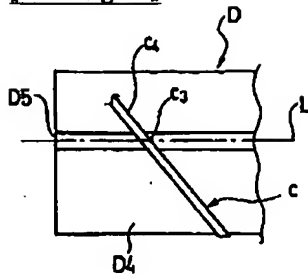
[Drawing 8]



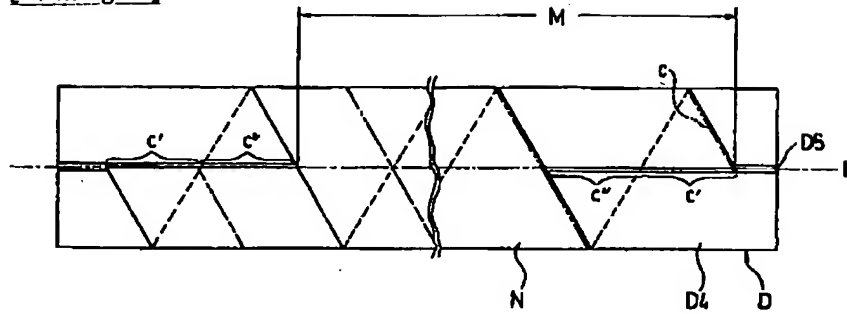
[Drawing 9]



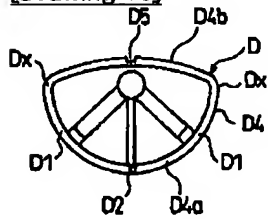
[Drawing 10]



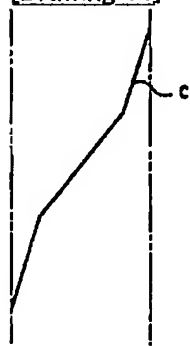
[Drawing 11]



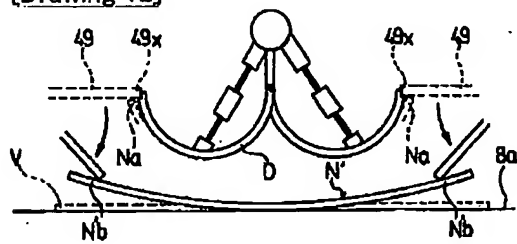
[Drawing 13]



[Drawing 14]



[Drawing 12]



[Translation done.]